

# Hydra-Cell<sup>®</sup>

Seal-less Pumps

**Precise Dosing and Rugged Reliability for Chemical and Petrochemical Processing**



**Chemical Processing**



# Pressure Injecting and Mixing • Transfer • Spraying • Metering and Dosing

## Compact, Seal-less Pumps Reduce Costs and Provide Dependable Performance

With more than 40 years of experience serving the industry, including many of the major global companies, Hydra-Cell pumps are performance-proved in efficiently pumping the widest range of corrosive, hot, abrasive, viscous, non-lubricating, and recycled fluids, as well as liquids containing solids. The multiple-diaphragm, seal-less design of Hydra-Cell provides 100% safe containment for even the most aggressive liquids while providing virtually pulse-free operation.

### Advantages of Hydra-Cell:

- Variety of models, wide range of capacities and ratings, plus extensive choices in materials of construction make Hydra-Cell ideally suited to a wide range of processing applications.
- Accurate and easy-to-control because the flow rate is proportional to the pump speed.
- Pumps the full spectrum of low-to-high viscosity fluids.
- Seal-less design can tolerate abrasive solids and particulate matter of up to 800 microns in size depending on pump model.
- Operational efficiencies reduce energy costs.
- Able to run dry without damage (or additional maintenance) to the pump in case of accident or operator error.
- Tolerates non-ideal operating conditions.
- Minimizes maintenance and downtime because there are no mechanical seals, cups, or packing to leak or replace.
- Metering pump models designed to exceed API 675 performance standards and provide virtually pulse-free, linear flow without the use of expensive pulsation dampeners.



Hydra-Cell pumping for waste stream reduction and salt solution concentration at a pharmaceutical chemical plant.

### Hydra-Cell Pumps Selection and Applications

Hydra-Cell positive displacement pumps are available in 22 pump models covering a wide range of flows and pressures.

Ten (10) Hydra-Cell Seal-less models are ideal for transfer, spraying, and pressure injecting and mixing.

Three (3) Hydra-Cell T100 Series triplex and two (2) Hydra-Cell Q155 Series quintuplex pumps are designed for larger capacities.

Seven (7) Hydra-Cell “pulse-free” metering pump models are ideal for metering and dosing, spraying, and pressure injecting and mixing.



In addition, four (4) solenoid metering pump models are available for economical chemical injection.



Hydra-Cell pumps are used in many industries with chemical processing applications.

- Agrichemical
- Biodiesel & Biotechnical
- Ceramics, Clay & Glass
- Industrial Organic & Inorganic
- Offshore Drilling & Processing
- Oil, Gas & Petrochemical
- Paints, Coatings, Sealants & Adhesives
- Pharmaceutical
- Polyurethane
- Propellant Packaging
- Pulp, Paper & Textiles
- Reverse Osmosis
- Rubber & Plastic
- Soaps, Cosmetics & Personal Care
- Water & Wastewater Treatment



Typical Liquids Pumped	Challenges in Pumping	The Hydra-Cell Advantage
<b>Acids</b> (Sulfuric, Hydrochloric, Nitric, et. al.)	Crystallization can occur under certain conditions creating solids in the liquid.	<ul style="list-style-type: none"> <li>Seal-less design and spring-loaded, horizontal disk check valves can handle abrasive, un-dissolved particles up to 800 microns in size (depending on model).</li> </ul>
	Aggressive and corrosive.	<ul style="list-style-type: none"> <li>No dynamic seals so corrosive liquids can be pumped reliably.</li> <li>Corrosion-resistant liquid end materials available.</li> </ul>
<b>Caustics</b> (Sodium Hydroxide, Potassium Hydroxide)	Crystallization can occur under certain conditions creating abrasive solid particles.	<ul style="list-style-type: none"> <li>Seal-less design and spring-loaded, horizontal disk check valves can handle abrasive, un-dissolved particles up to 800 microns in size (depending on model).</li> </ul>
<b>Solvents</b>	Non-lubricating.	<ul style="list-style-type: none"> <li>No dynamic seals that need to be lubricated by the process liquid.</li> </ul>
<b>Slurries</b>	Contains abrasive non-soluble particles that can damage dynamic seals.	<ul style="list-style-type: none"> <li>No dynamic seals to be damaged by abrasive solids.</li> </ul>
<b>Polymers</b>	May shear thin liquids easily, breaking down the chemistry.	<ul style="list-style-type: none"> <li>Low-shear pumping action and virtually pulse-free flow that protect polymers.</li> </ul>
	May flocculate if exposed to excessive temperatures.	<ul style="list-style-type: none"> <li>Minimal heat transfer from the pump to the process liquid.</li> </ul>
<b>Resins</b>	Exposure to air can cause crystallization.	<ul style="list-style-type: none"> <li>No dynamic seals to leak air into the pump liquid or to be damaged by solid abrasive particles.</li> </ul>
	Viscous liquids.	<ul style="list-style-type: none"> <li>Can handle high-viscosity liquids.</li> </ul>
<b>De-ionized Water</b>	Non-lubricating and aggressive.	<ul style="list-style-type: none"> <li>No dynamic seals that need to be lubricated by the process liquid.</li> </ul>
<b>Recycled Liquids</b>	Crystals can form when exposed to air resulting in non-dissolved solid particles in the resin.	<ul style="list-style-type: none"> <li>No dynamic seals or tight tolerances sitting in the process liquid to be damaged by the solid particles.</li> </ul>
<b>Hydrocarbons</b>	Non-lubricating.	<ul style="list-style-type: none"> <li>No dynamic seals that need to be lubricated by the process liquid.</li> </ul>
	Thin, very low-viscosity liquids search for leak paths.	<ul style="list-style-type: none"> <li>No dynamic seals to leak. Pumped liquid is 100% contained.</li> </ul>
<b>Waste Chemical Streams</b>	May contain non-lubricating corrosive liquids with non-dissolved particles.	<ul style="list-style-type: none"> <li>No dynamic seals to be damaged by process liquid.</li> </ul>
<b>Proprietary Chemicals</b>	Complex chemistry may mean exotic materials are needed for the pump head.	<ul style="list-style-type: none"> <li>Compact design and interchangeable liquid end parts provide the flexibility and ease to handle complex, proprietary chemicals reliably and cost effectively.</li> </ul>
<b>Hot Liquids</b>	Higher temperatures have a dramatic effect on speeding up corrosion rates.	<ul style="list-style-type: none"> <li>No dynamic seals mean that Hydra-Cell can handle liquids with temperatures up to 250° F.</li> </ul>

# Lower Initial Investment and Lower Energy Costs

## Uses lower hp motors

- Although both pumps have the same pressure rating, the lighter, more compact Hydra-Cell has a higher flow rating while requiring a less expensive, lower hp motor. This means Hydra-Cell saves approximately 30% to 55% on initial costs.

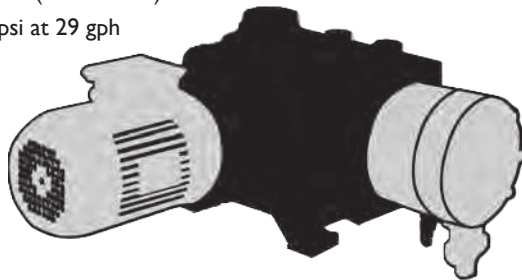


### Hydra-Cell metering pump

Weight: 83.5 lbs. (with motor)  
 Rated: 2500 psi at 36 gph  
 Motor: 1-1/2 hp

## Conventional metering pump

Weight: 220 lbs. (with motor)  
 Rated: 2500 psi at 29 gph  
 Motor: 5 hp



## Low power consumption - 85% to 90% energy efficiency

- The lower hp requirement of the Hydra-Cell pump achieves the same performance but with greater energy efficiency and less power consumption.
- Hydra-Cell positive displacement pumps show significant energy savings when compared to screw pumps and multi-stage centrifugal pumps (notably in cleaning and transfer applications).



The multiple-diaphragm liquid head of Hydra-Cell also allows a less expensive, energy-saving motor to be used.

## Small footprint for savings

- Compact design can mean up to 30% lower initial cost compared to other pumps.
- Space-saving design creates a smaller footprint for more efficient use of plant space.
- Easier to access for routine maintenance or servicing.



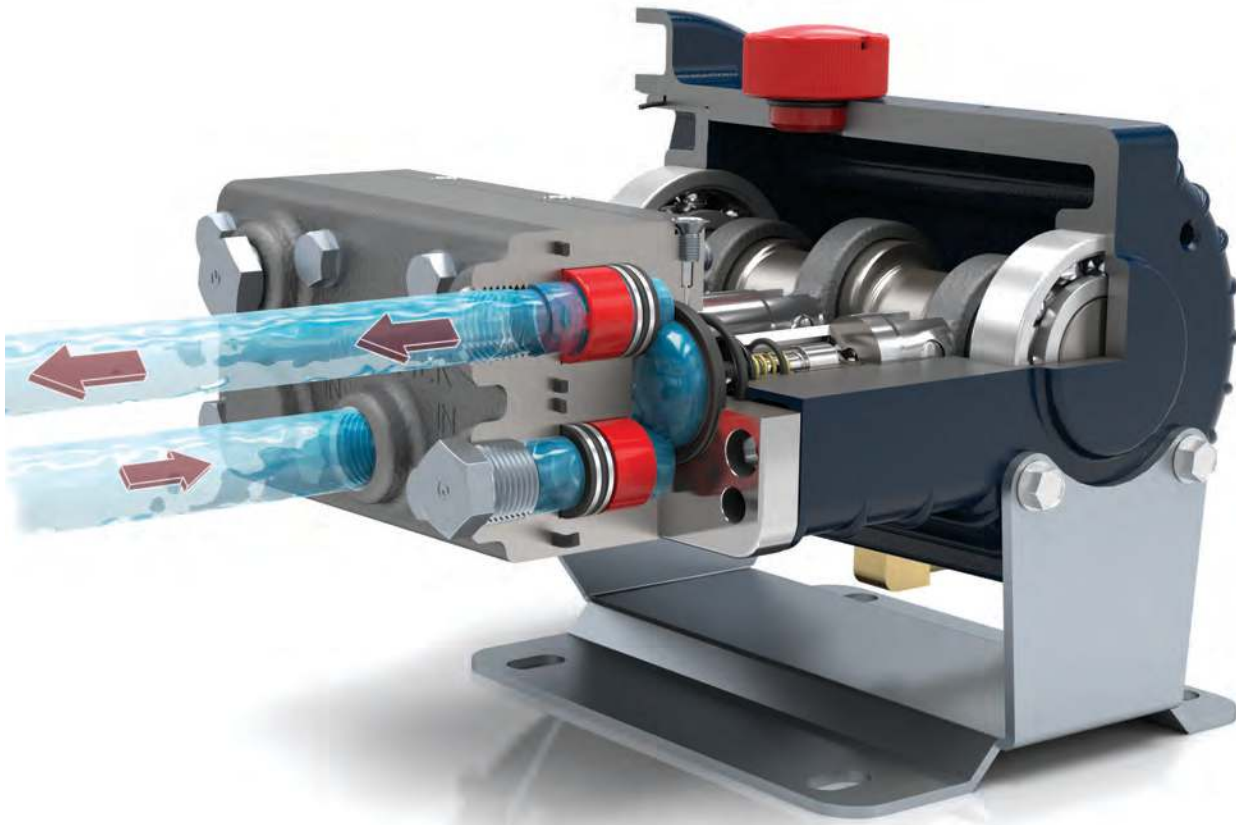
**Pumps Shown to Scale**

The Hydra-Cell and triplex metering pumps both have the same flow capacity and pressure rating; however, space-saving Hydra-Cell has a much smaller footprint. Conventional metering pumps can become oversized and overpriced at higher flow/pressure requirements.

## Minimal filtration

- Unlike gear pumps and screw pumps that wear excessively without fine filtration, Hydra-Cell has no dynamic seals or tight tolerances that need protection by fine filtration.
- Seal-less design handles abrasive particles up to 800 microns in size (depending on pump model) and up to 9 hardness on the Mohs scale.
- Can pump liquids with non-dissolved solids up to 40% depending on particle distribution.
- Unaffected by lapses in filtration, reducing costly pump repairs.
- Less need for costly filtration management and maintenance.

# Pumps Abrasives and Low-to-High Viscosity Fluids



*Hydra-Cell's horizontal check valve orientation will handle abrasives and particulates without clogging or damaging the pump.*

## Handles abrasives and particulates

- Seal-less design and spring-loaded, horizontal disk check valves provide superior handling of abrasive fillers and particulates.
- Reliably pumps acids and caustics which crystallize.
- Efficiently pumps liquids with solids such as lime slurries and sour water containing sand.

## Runs dry without damage

- Running dry can damage or destroy gear pumps and screw pumps, requiring costly repairs or pump replacement, and resulting in lost production. Hydra-Cell pumps can run dry without damage to the pump.
- When an interruption in flow is caused by suction blockage or a valve closure, gear pumps and screw pumps can fail immediately. Hydra-Cell pumps equipped with patented Kel-Cell® Diaphragm Position Control (DPC) will not be affected, allowing for correction of the interruption.

## Environmental protection

- Liquids are 100% sealed from the atmosphere.
- No leak path for toxic vapors or harmful gases (e.g. H<sub>2</sub>S).
- No dynamic seals to leak any Volatile Organic Compounds (VOC).

## Handles low-to-high viscosity fluids

- Pumps thin to highly viscous liquids throughout the entire pressure range.
- Low-shear pumping action makes Hydra-Cell ideal for pumping and protecting shear-sensitive polymers.
- Non-lubricating liquids can be pumped reliably.



*Hydra-Cell pumping shear-sensitive polymers for enhanced oil recovery.*

# Accurate Metering and Dosing with Pulse-free, Linear Flow

## Accurate electronic flow control

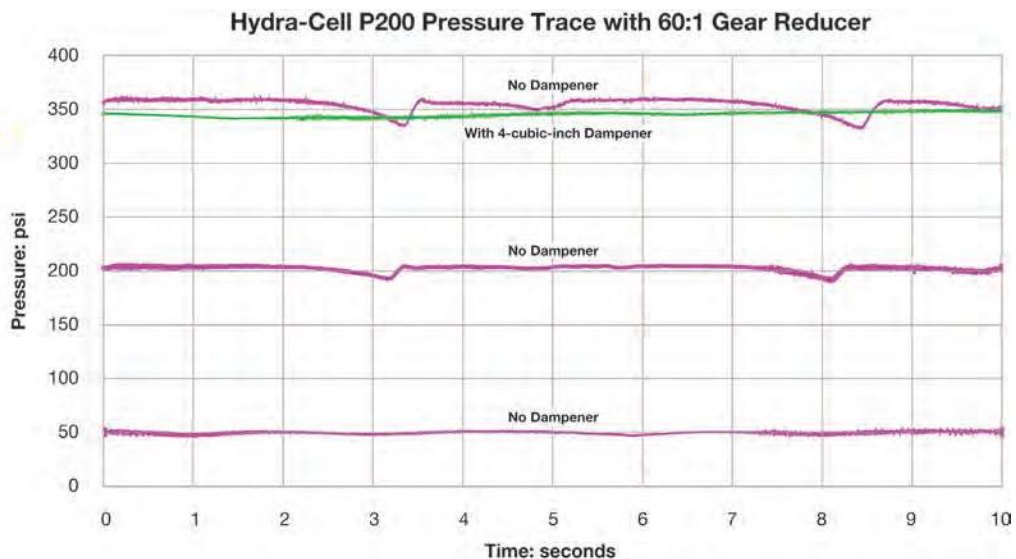
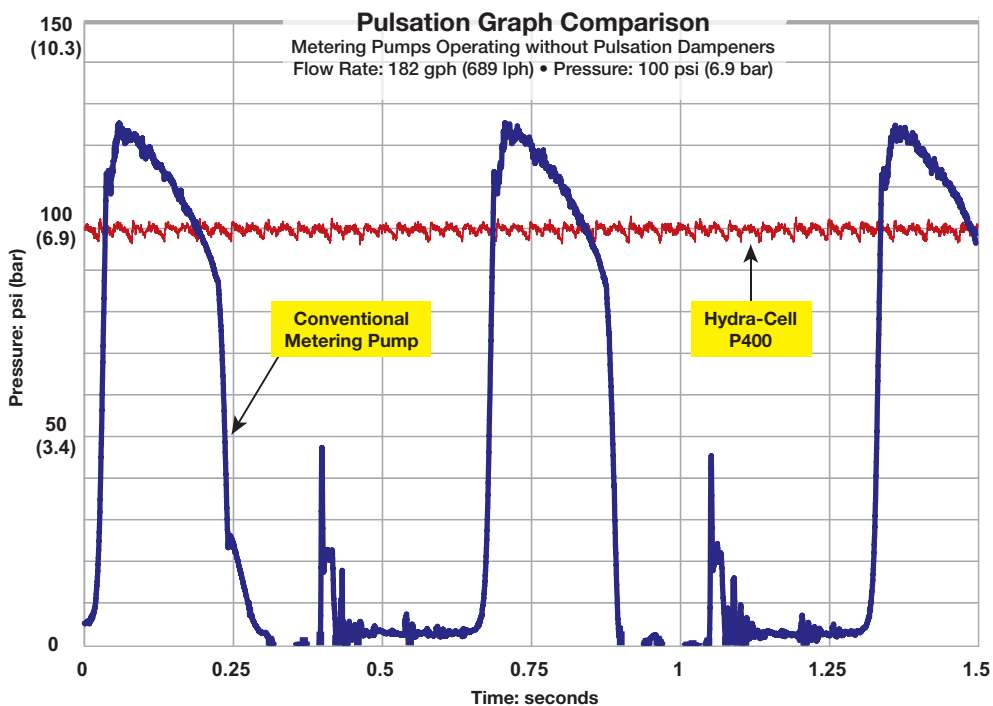
- Compared to pumps that rely on manual stroke adjustment or expensive actuators to change flow, Hydra-Cell metering pumps utilize speed control for greater accuracy throughout the turndown range.
- Can be equipped with solid-state electronic flow control where the volume per every stroke is constant and a known value.
- Electronic flow also provides easy calibration of the desired feed rate and a near instantaneous rate of change (0 to maximum rpm in 0.3 seconds).

	Hydra-Cell Seal-less Pump Models	Hydra-Cell Metering Pump Models
Steady State Accuracy	±1%	±1% or better
Repeatability	±3%	±3% or better
Linearity	±3%	±3% or better

*Typical results for recommended speed range*

## Virtually pulse-free flow

- Multiple-diaphragm design minimizes pulsations, eliminating the need for expensive pulsation dampeners for most Hydra-Cell models.
- Reduces pipe strain.
- Enhances operating safety.
- Minimizes maintenance.
- Reduces acceleration/friction losses in the suction line.
- Provides accurate metering with linear, constant flow.
- Lowers system acquisition costs.



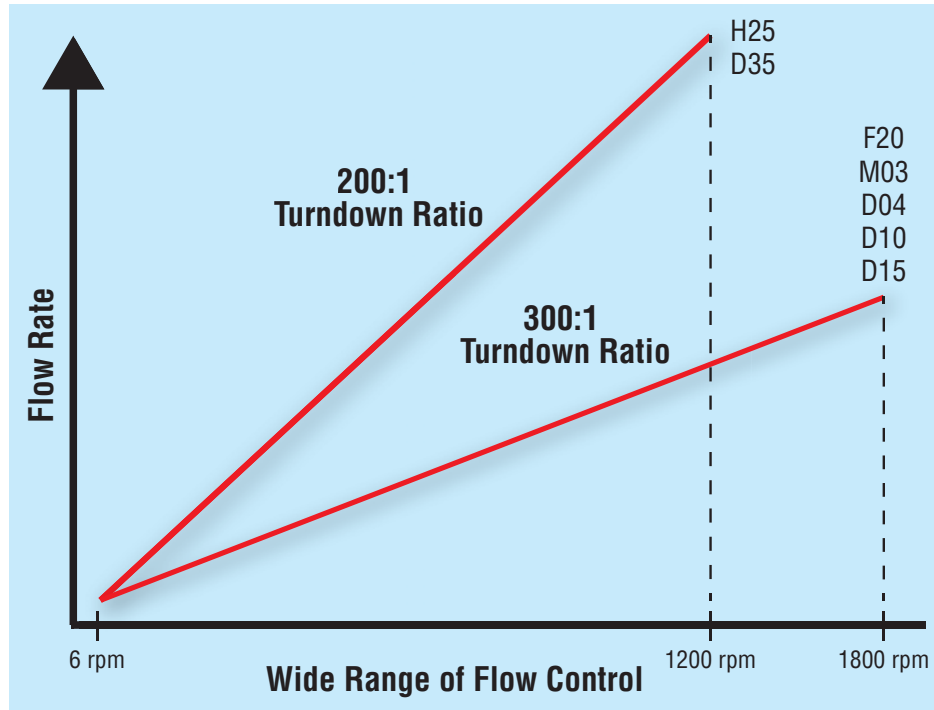
# One Versatile, Low-Maintenance Pump Design

## Adaptable to many applications

- One Hydra-Cell design with 22 models (10 seal-less; 7 metering; 5 large capacity) covers a wide range of flows and operating pressures.
- Can be fitted with ANSI, SAE or DIN flanges, IEC or NEMA motor mounts, or provided with ATEX certification to adapt to specific applications or meet international standards.
- Proven record of replacing different pump technologies with improved abrasives handling, less maintenance, and other benefits (as detailed on pages 8-11).

## Extensive operating range

- Shaft speeds from 6 rpm to 1800/1200 rpm, yielding a 300/200:1 turndown ratio.
- Maximum discharge pressures from 700 to 3500 psi.
- Maximum flow rates for seal-less Hydra-Cell models from 1 to 66 gpm and for metering pumps from 8 to 890 gph.
- Minimum flow rates less than 0.15 gph at approximately 6 rpm.



## Simple pump head design

- Liquid head materials can be changed readily, enabling Hydra-Cell to be used for many different chemicals and liquids pumped.
- Minimal maintenance required with no special tools needed.
- Low cost of spare parts.

	Minimum	Maximum
Flow Rate	0.0025 gpm (0.15 gph)	37 gpm (2220 gph)
Discharge Pressure	0 psi	2500 psi

**Note:** Triplex metering pump (model MT8) now available with minimum flow rate of 0.06 gph and pressure rating of 3500 psi.



## Low maintenance

- No mechanical seals, cups or packing to leak, wear, or replace.
- No tight tolerances that could be susceptible to corrosion or damaged by solid particles.
- One design for all applications minimizes the need for standby pumps and spare parts, which optimizes training and service expertise and reduces inventory size and expense.
- Since there are no dynamic seals to wear or replace, Hydra-Cell pumps need little maintenance and will operate reliably under continuous duty at high pressure.
- Any maintenance or repair can usually be performed on-site.
- Can operate up to 6,000 hours between lubricating oil changes (compared to 1,500 hours recommended by many piston pump manufacturers).

# Hydra-Cell® Performance Advantages Compared to Other Types of Pumps

Magnetic Drive Pump Disadvantages:	Hydra-Cell Advantages:
<ul style="list-style-type: none"> <li>Running dry can result in damage to the pump.</li> </ul>	<ul style="list-style-type: none"> <li>Seal-less design enables Hydra-Cell to run dry without damage to the pump.</li> </ul>
<ul style="list-style-type: none"> <li>Requires monitoring to ensure fluid flow.</li> </ul>	<ul style="list-style-type: none"> <li>Ensures proper fluid flow without monitoring.</li> </ul>
<ul style="list-style-type: none"> <li>Designed to pump clean, low-viscosity fluids.</li> </ul>	<ul style="list-style-type: none"> <li>Low-shear pumping action handles higher viscosity fluids.</li> </ul>
<ul style="list-style-type: none"> <li>Higher power requirements and energy costs.</li> </ul>	<ul style="list-style-type: none"> <li>Uses lower hp motors.</li> <li>More energy efficient.</li> </ul>
<ul style="list-style-type: none"> <li>Can have a long horizontal footprint with higher acquisition and replacement costs.</li> </ul>	<ul style="list-style-type: none"> <li>Smaller footprint compared to some magnetic drive pumps.</li> <li>Easier to service.</li> <li>Lower acquisition, operating and replacement costs.</li> </ul>

Peristaltic Pump Disadvantages:	Hydra-Cell Advantages:
<ul style="list-style-type: none"> <li>Require expensive pulsation dampeners to minimize pulsations.</li> </ul>	<ul style="list-style-type: none"> <li>Multiple-diaphragm design provides virtually pulse-free flow, so expensive pulsation dampeners may not be required.</li> </ul>
<ul style="list-style-type: none"> <li>Pump tube operates under stress, resulting in a consumable part that will need to be replaced.</li> </ul>	<ul style="list-style-type: none"> <li>Diaphragms operate in hydraulic balance and are not under stress, thus providing long service life.</li> </ul>

Conventional Metering Pump Disadvantages:	Hydra-Cell Advantages:
<ul style="list-style-type: none"> <li>Use manual stroke adjusters or expensive actuators to control flow, which can result in pumping inaccuracies, lost motion, operator error, and a greater chance of leakage.</li> </ul>	<ul style="list-style-type: none"> <li>Hydra-Cell employs optional Variable Frequency Drive (VFD) electronic flow control for greater accuracy and repeatability, eliminating lost motion, reducing the chance of operator error, and removing a potential leak path.</li> </ul>
<ul style="list-style-type: none"> <li>Require expensive pulsation dampeners to minimize pulsations.</li> </ul>	<ul style="list-style-type: none"> <li>Multiple-diaphragm design provides virtually pulse-free flow, so expensive pulsation dampeners may not be required.</li> </ul>
<ul style="list-style-type: none"> <li>May only offer PTFE diaphragms, requiring frequent replacement due to stress and poor elastomeric memory.</li> </ul>	<ul style="list-style-type: none"> <li>Available with a wide choice of cost-effective, elastomeric diaphragm materials.</li> </ul>
<ul style="list-style-type: none"> <li>Large footprint to achieve required maximum flow and pressure.</li> </ul>	<ul style="list-style-type: none"> <li>Can meet the same flow and pressure requirements with a much smaller footprint, saving space and costs.</li> </ul>
<ul style="list-style-type: none"> <li>Different plunger and liquid end sizes needed to accommodate changes in operating pressures.</li> </ul>	<ul style="list-style-type: none"> <li>Operates over a wide range of pressures without changes to the plunger or liquid end size.</li> </ul>
<ul style="list-style-type: none"> <li>Integral gearing (necessary to prevent cross-contamination of actuating oil) is difficult and expensive to maintain.</li> </ul>	<ul style="list-style-type: none"> <li>The simplicity of design means lower parts and maintenance costs.</li> <li>Separate gearbox prevents cross-contamination of the actuating oil.</li> </ul>





Compared to other pumps, Hydra-Cell requires minimal maintenance for chemical processors. Hydra-Cell has no mechanical seals, cups or packing that leak or need to be replaced and no internal gears to wear.

Internal Gear Pump Disadvantages:	Hydra-Cell Advantages:
<ul style="list-style-type: none"> <li>Mechanical seals and packing require maintenance, and replacement or adjustment.</li> </ul>	<ul style="list-style-type: none"> <li>The seal-less design of Hydra-Cell means that there are no mechanical seals or packing to leak or replace.</li> </ul>
<ul style="list-style-type: none"> <li>Does not tolerate thin/non-lubricating liquids, and does not handle solids, abrasives or particulates well.</li> </ul>	<ul style="list-style-type: none"> <li>Seal-less pumping chamber and spring-loaded, horizontal disk check valves can pump solids, abrasive fillers and particulates while handling liquids thick or thin.</li> </ul>
<ul style="list-style-type: none"> <li>Designed for operating at low speeds and low pressure ratings.</li> <li>Low volumetric efficiency.</li> </ul>	<ul style="list-style-type: none"> <li>Operates at low-to-high speeds and at higher pressures with higher volumetric efficiency.</li> </ul>
<ul style="list-style-type: none"> <li>Component wear reduces accuracy and efficiency.</li> </ul>	<ul style="list-style-type: none"> <li>No internal gears to wear so there is less maintenance and spare part replacement.</li> <li>Accuracy and efficiency are more stable.</li> </ul>
<ul style="list-style-type: none"> <li>One bearing runs in the pumped fluid.</li> </ul>	<ul style="list-style-type: none"> <li>No bearings in the pumped fluid.</li> </ul>
<ul style="list-style-type: none"> <li>Unbalanced - overhung load on the shaft bearing.</li> </ul>	<ul style="list-style-type: none"> <li>Hydraulically balanced design so there is no overhung load.</li> </ul>

External Gear Pump Disadvantages:	Hydra-Cell Advantages:
<ul style="list-style-type: none"> <li>Mechanical seals and packing require maintenance, and replacement or adjustment.</li> </ul>	<ul style="list-style-type: none"> <li>The seal-less design of Hydra-Cell means that there are no mechanical seals or packing to leak or replace.</li> </ul>
<ul style="list-style-type: none"> <li>Does not tolerate solids, abrasives, or particulates.</li> </ul>	<ul style="list-style-type: none"> <li>Seal-less pumping chamber and spring-loaded, horizontal disk check valves can pump solids, abrasive fillers and particulates.</li> </ul>
<ul style="list-style-type: none"> <li>Component wear reduces accuracy and efficiency.</li> </ul>	<ul style="list-style-type: none"> <li>No internal gears to wear so efficiency is more stable and there is less maintenance and spare part replacement.</li> </ul>
<ul style="list-style-type: none"> <li>Contains four bushings/bearings in the fluid area.</li> </ul>	<ul style="list-style-type: none"> <li>No bushings/bearings in the pumped fluid.</li> </ul>
<ul style="list-style-type: none"> <li>Fixed end clearances are typical.</li> </ul>	<ul style="list-style-type: none"> <li>Design does not rely on clearances.</li> </ul>
<ul style="list-style-type: none"> <li>Efficiency drops as outlet pressure increases.</li> </ul>	<ul style="list-style-type: none"> <li>Efficiency remains relatively constant over its range of operating pressures.</li> </ul>
<ul style="list-style-type: none"> <li>Depends on pumped liquid for lubrication.</li> </ul>	<ul style="list-style-type: none"> <li>Seal-less design does not require pumped liquid for lubrication.</li> </ul>

# Hydra-Cell® Performance Advantages Compared to Other Types of Pumps

Centrifugal Pump Disadvantages:	Hydra-Cell Advantages:
<ul style="list-style-type: none"> <li>• Double mechanical seals are expensive and require a fluid barrier system.</li> </ul>	<ul style="list-style-type: none"> <li>• The seal-less design of Hydra-Cell means that there are no mechanical seals or packing to leak or replace.</li> </ul>
<ul style="list-style-type: none"> <li>• Particulates and fines in the pumped fluid will cause wear in the case and the impellers.</li> </ul>	<ul style="list-style-type: none"> <li>• Seal-less pumping chamber with spring-loaded, horizontal disk check valves can pump particulates and fines up to 800 microns in size (depending on pump model).</li> </ul>
<ul style="list-style-type: none"> <li>• Difficult to maintain high efficiency with varying flow rate.</li> </ul>	<ul style="list-style-type: none"> <li>• Designed for efficient delivery at varying flow rates.</li> </ul>
<ul style="list-style-type: none"> <li>• Running dry can cause a catastrophic mechanical seal failure.</li> </ul>	<ul style="list-style-type: none"> <li>• Can run dry without damage to the pump. Entrapped air does not cause immediate failure.</li> </ul>
<ul style="list-style-type: none"> <li>• Ineffective at low flow rates and high outlet pressures.</li> </ul>	<ul style="list-style-type: none"> <li>• Runs at very low speeds and flow rates while maintaining outlet pressures.</li> </ul>
<ul style="list-style-type: none"> <li>• Flow rate is difficult to control effectively.</li> </ul>	<ul style="list-style-type: none"> <li>• Positive displacement design allows for accurate speed control.</li> </ul>
<ul style="list-style-type: none"> <li>• Higher pressure requires additional stages with an increasing footprint for horizontal pumps.</li> </ul>	<ul style="list-style-type: none"> <li>• Can meet same flow and pressure requirements with a much smaller footprint, saving space as well as investment and operation costs.</li> </ul>

Progressive Cavity Pump Disadvantages:	Hydra-Cell Advantages:
<ul style="list-style-type: none"> <li>• Dynamic seals are worn by pumping abrasive fluids.</li> </ul>	<ul style="list-style-type: none"> <li>• No dynamic seals in the pumped fluid; can handle abrasive fluids reliably.</li> </ul>
<ul style="list-style-type: none"> <li>• Hydrodynamic film between the stator and rotor cam breaks down under pressure, reducing flow rate and negating true positive displacement pumping action.</li> </ul>	<ul style="list-style-type: none"> <li>• Seal-less pump chamber with hydraulically-balanced diaphragms mean that flow rate is maintained even as discharge pressure increases.</li> </ul>
<ul style="list-style-type: none"> <li>• Running dry can result in damage to the pump.</li> </ul>	<ul style="list-style-type: none"> <li>• Seal-less design enables Hydra-Cell to run dry without damage to the pump.</li> </ul>
<ul style="list-style-type: none"> <li>• Higher pressure requires additional stages with an increasing footprint for horizontal pumps.</li> </ul>	<ul style="list-style-type: none"> <li>• Can meet same flow and pressure requirements with a much smaller footprint, saving space as well as investment and operation costs.</li> </ul>

Plunger/Piston Pump Disadvantages:	Hydra-Cell Advantages:
<ul style="list-style-type: none"> <li>• Packing requires frequent adjustments and then replacement as it wears.</li> </ul>	<ul style="list-style-type: none"> <li>• Seal-less design uses no packing, reducing downtime and maintenance costs.</li> </ul>
<ul style="list-style-type: none"> <li>• Packing must leak to provide lubrication – creating maintenance, containment, disposal, safety, and housekeeping issues with their associated costs.</li> </ul>	<ul style="list-style-type: none"> <li>• No packing means no secondary containment requirements, no clean-up or disposal issues, improved safety, and reduced maintenance costs.</li> </ul>
<ul style="list-style-type: none"> <li>• Packing allows emissions that require expensive “vapor-less” alternatives or vapor recovery systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Seal-less design eliminates emissions and costly associated fines.</li> </ul>
<ul style="list-style-type: none"> <li>• Packing causes plunger wear, which is made worse by abrasive media; the plunger, stuffing box, and packing must be compatible with the product being pumped.</li> </ul>	<ul style="list-style-type: none"> <li>• Diaphragm design allows pumping of abrasive and corrosive media without concern for wear, compatibility or replacement of packing or plunger/piston.</li> </ul>
<ul style="list-style-type: none"> <li>• May require external lubrication systems at an additional cost of up to \$3,000 – another maintenance and repair factor.</li> </ul>	<ul style="list-style-type: none"> <li>• No lubrication necessary, resulting in less maintenance and lower cost of ownership expenses.</li> </ul>



Model D10 (above left) fitted with ANSI flanges. Hydra-Cell pumps are also available with SAE or DIN flanges, NEMA or IEC motor mounts, or provided with ATEX certification to adapt to specific applications or meet international standards.

Triple Screw Pump Disadvantages:	Hydra-Cell Advantages:
<ul style="list-style-type: none"> <li>• Close tolerances and running clearances require ultra-filtration (usually to &lt;10 microns).</li> </ul>	<ul style="list-style-type: none"> <li>• Precisely-engineered tolerances and seal-less design eliminate the need for fine filtration.</li> </ul>
<ul style="list-style-type: none"> <li>• Performance characteristics sensitive to viscosity change.</li> </ul>	<ul style="list-style-type: none"> <li>• Pumps thin or highly viscous liquids with equal efficiency.</li> </ul>
<ul style="list-style-type: none"> <li>• Mechanical seals and packing require maintenance, and replacement or adjustment.</li> </ul>	<ul style="list-style-type: none"> <li>• The seal-less design of Hydra-Cell means that there are no mechanical seals or packing to leak or replace.</li> </ul>
<ul style="list-style-type: none"> <li>• Does not tolerate solids, fines, abrasives or particulates.</li> </ul>	<ul style="list-style-type: none"> <li>• Seal-less pumping chamber with spring-loaded, horizontal disk check valves can pump fines up to 800 microns in size (depending on pump model).</li> </ul>
<ul style="list-style-type: none"> <li>• Inefficient at low speeds (usually requires minimum 1000 rpm).</li> </ul>	<ul style="list-style-type: none"> <li>• Runs at very low speeds (from 18 to 1800 rpm) while maintaining outlet pressures.</li> </ul>
<ul style="list-style-type: none"> <li>• Depends on pumped fluid for sealing and hydrodynamic lubrication.</li> </ul>	<ul style="list-style-type: none"> <li>• No requirement for the pumped fluid to seal or lubricate.</li> </ul>
<ul style="list-style-type: none"> <li>• Contains bushings in the pumped fluid.</li> </ul>	<ul style="list-style-type: none"> <li>• No bushings in the pumped fluid.</li> </ul>
<ul style="list-style-type: none"> <li>• Dry running and entrapped air cause immediate damage.</li> </ul>	<ul style="list-style-type: none"> <li>• Can run dry without damage to the pump. Tolerates entrapped air.</li> </ul>
<ul style="list-style-type: none"> <li>• Incorrect direction of rotation results in damage to the pump.</li> </ul>	<ul style="list-style-type: none"> <li>• Hydra-Cell pumps are bidirectional, eliminating the risk of damage.</li> </ul>

# Hydra-Cell Positive Displacement Diaphragm Pumps are Ideal for Handling Abrasives and Particulates



**Hydra-Cell**  
Seal-less Pumps

- Unmatched versatility for a wide range of pumping applications required in the chemical and petrochemical industries.
- Features a seal-less design and horizontal disk check valves that enable the pump to handle abrasives and particulates that might damage or destroy other types of pumps.
- Simple, compact design reduces initial investment and lowers maintenance costs.
- Selection of models that can operate with very low to very high flow rates and discharge pressures up to 2500 psi.
- Available in a wide range of pump head materials of construction and diaphragm materials.
- Variety of options and accessories to optimize performance.

## Flow Capacities and Pressure Ratings

Model <sup>1</sup>	Maximum Capacity gpm (l/min)	Maximum Discharge Pressure psi (bar)		Maximum Operating Temperature F (C) <sup>3</sup>		Maximum Inlet Pressure psi (bar)
		Non-metallic <sup>2</sup>	Metallic	Non-metallic	Metallic	
<b>F20</b>	1.0 (3.8)	350 (24)	1500 (103)	140° (60°)	250° (121°)	250 (17)
<b>M03</b>	3.1 (11.7)	350 (24)	1200 (83)	140° (60°)	250° (121°)	250 (17)
<b>D04</b>	2.9 (11.2)	N/A	2500 (172)	N/A	250° (121°)	500 (34)
<b>D10<sup>4</sup></b>	4.3 (15.1)	N/A	1500 (103)	N/A	250° (121°)	250 (17)
<b>D10</b>	8.8 (33.4)	350 (24)	1000 (69)	140° (60°)	250° (121°)	250 (17)
<b>D12</b>	8.8 (33.4)	N/A	1000 (69)	N/A	250° (121°)	250 (17)
<b>D15 &amp; D17</b>	15.5 (58.7)	N/A	2500 (172)	N/A	250° (121°)	500 (34)
<b>H25</b>	20.0 (75.9)	350 (24)	1000 (69)	140° (60°)	250° (121°)	250 (17)
<b>D35<sup>5</sup></b>	23.1 (87.5)	N/A	1500 (103)	N/A	250° (121°)	250 (17)
<b>D35</b>	36.5 (138)	N/A	1200 (83)	N/A	250° (121°)	500 (34)
<b>D66</b>	65.7 (248.7)	250 (17)	700 (48)	140° (60°)	250° (121°)	250 (17)

<sup>1</sup> Ratings are for cam design with the highest flow rate.

<sup>2</sup> 350 psi (24 bar) maximum with PVDF liquid end; 250 psi (17 bar) maximum with Polypropylene liquid end.

<sup>3</sup> Consult factory for correct component selection for temperatures from 160°F (71°C) to 250°F (121°C).

<sup>4</sup> D10 @790 rpm maximum.

<sup>5</sup> D35 @700 rpm maximum.

**For complete specifications and ordering information, consult the Hydra-Cell catalog.**

# Hydra-Cell P Series Metering Pumps Exceed API 675 Standards and Provide “Pulse-free” Linear Flow



The IChemE Awards recognize innovation and excellence in making outstanding contributions to safety, the environment, and sustainable development in the chemical and bioprocess industries.

**Hydra-Cell**<sup>®</sup>  
METERING SOLUTIONS™

- Designed for use with Variable Frequency Drive (VFD) electronic flow control to maintain greater accuracy throughout the turndown range.
- Multiple-diaphragm design (except the PI00) provides virtually pulse-free flow, eliminating the need to purchase expensive pulsation dampeners.
- Offers all the features and benefits of standard Hydra-Cell pumps (F/M/D/H Series) including seal-less design, horizontal disk check valves, and space-saving, compact design.
- Selection of models that can operate with very low to very high flow rates and discharge pressures up to 2500 psi.
- Available in a wide range of pump head materials of construction and diaphragm materials.
- Every model is available with multiple gearbox ratios to meet your application needs.
- Variety of options and accessories to optimize performance.

## Flow Capacities and Pressure Ratings

Model <sup>1</sup>	Maximum Capacity gph <sup>2</sup>	Maximum Discharge Pressure psi (bar)		Maximum Operating Temperature F (C) <sup>4</sup>		Maximum Inlet Pressure psi (bar)
		Non-metallic <sup>3</sup>	Metallic	Non-metallic	Metallic	
<b>PI00</b>	27.0	350 (24)	1500 (103)	140° (60°)	250° (121°)	250 (17)
<b>P200</b>	81.0	350 (24)	1000 (69)	140° (60°)	250° (121°)	250 (17)
<b>P300</b>	81.4	N/A	2500 (172)	N/A	250° (121°)	500 (34)
<b>P400</b>	242.8	350 (24)	1000 (69)	140° (60°)	250° (121°)	250 (17)
<b>P500</b>	425.9	N/A	2500 (172)	N/A	250° (121°)	500 (34)
<b>P600</b>	890.3	350 (24)	1000 (69)	140° (60°)	250° (121°)	250 (17)

<sup>1</sup> Ratings are for X-cam design.

<sup>2</sup> Consult factory for ratings in liters per hour (lph).

<sup>3</sup> 350 psi (24 bar) maximum with PVDF liquid end; 250 psi (17 bar) maximum with Polypropylene liquid end.

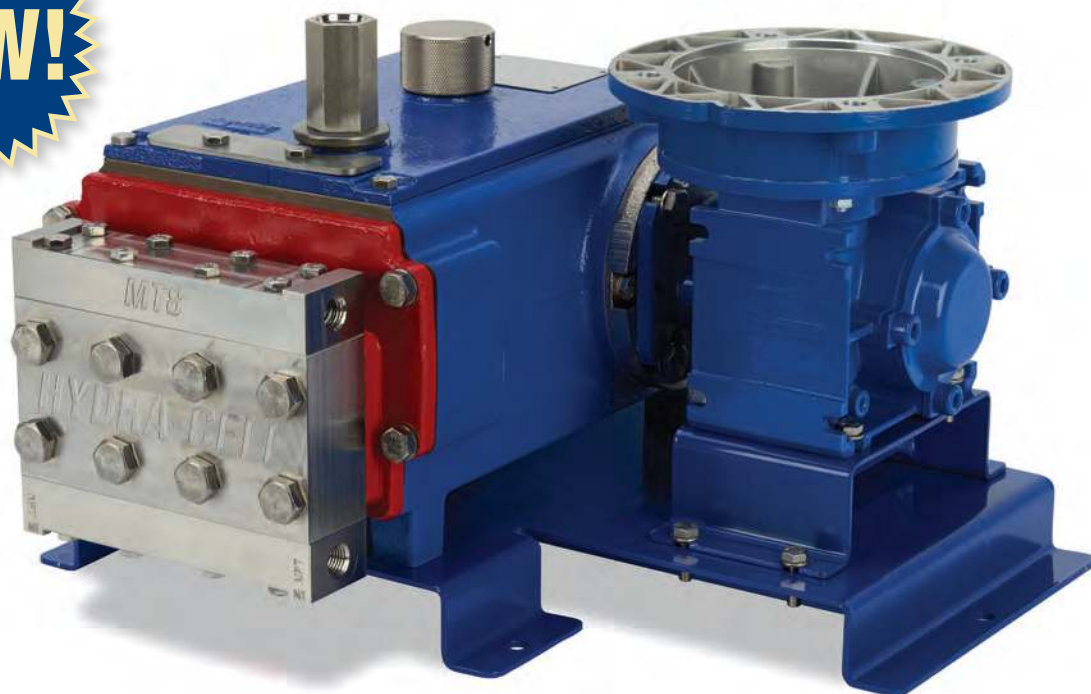
<sup>4</sup> Consult factory for correct component selection for temperatures from 160°F (71°C) to 250°F (121°C).

For complete specifications and ordering information, consult the Hydra-Cell P Series metering pumps catalog.

# Hydra-Cell MT8 Triplex Metering Pumps Can Deliver “Pulse-free” Low Flow Rates at High Pressure

**Hydra-Cell**  
METERING SOLUTIONS™

**NEW!**



*MT8 with Stainless Steel pump head*

## Ideal for Chemical Processing

With the capability to deliver low flow rates (from 0.06 gph/0.227 lph to 8.00 gph/30.28 lph) at a wide range of pressures to 3500 psi (241 bar), the Hydra-Cell MT8 can be used for many different types of metering applications in the chemical processing industries.

## Exceeds API Performance Standards

Hydra-Cell Metering Solutions model MT8 pumps exceed API 675 performance standards for Steady-State Accuracy ( $\pm 1\%$ ), Linearity ( $\pm 3\%$ ), and Repeatability ( $\pm 3\%$ ).

- Multiple-diaphragm design provides virtually pulse-free, linear flow without the need for expensive pulsation dampeners.
- Handles a wide range of processing fluids.
- Built-in pressure valve and a unique replenishment valve system protect the pump in the event of blocked suction.
- Electronic flow control increases accuracy and reliability.
- Rugged construction in a smaller footprint that saves valuable space.
- One pump covers a wide range of flows and pressures - reducing inventory requirements with fast, simple field conversion.
- Seal-less design means no seals, cups, or packing to leak or replace.



*ATEX-compliant manual variable speed gearbox*

# Hydra-Cell MT8 Low-flow/High-pressure Triplex Metering Pumps



Duplexing capability doubles capacity and savings



MT8 with PVC pump head



MT8 with PVDF pump head

## Flow Capacities and Pressure Ratings

Model	Maximum Capacity gph (lph)	Maximum Discharge Pressure psi (bar)		Maximum Operating Temperature F (C) <sup>2</sup>		Maximum Inlet Pressure psi (bar)
		Non-metallic <sup>1</sup>	Metallic	Non-metallic	Metallic	
<b>MT8</b>	0.06 to 8.00 (0.227 to 30.28)	350 (24)	3500 (241)	140° (60°)	250° (121°)	250 (17)

<sup>1</sup> 350 psi (24 bar) maximum with PVDF liquid end; 250 psi (17 bar) maximum with PVC liquid end.

<sup>2</sup> Consult factory for correct component selection for temperatures from 160°F (71°C) to 250°F (121°C).

**Availability of MT8 non-metallic (PVC and PVDF) pump head models and additional metallic (Alloy 20 and Hastelloy C®) pump head models to be announced.**

For complete specifications and ordering information, consult the Hydra-Cell MT8 product bulletin.

# Hydra-Cell S Series Electronic Solenoid Metering Pumps Offer Economical and Eco-friendly Chemical Injection

**Hydra-Cell®**  
METERING SOLUTIONS™

**NEW!**



SM models with simple hand-operated, manual control.



SP models with pulse-input control plus digital readout.



ST models with pulse-input control and timer plus digital readout.



SA models with pulse-input and analog-input control plus digital readout.

S Series electronic metering pumps are ideal for low-flow, low-pressure requirements. They will complement other Hydra-Cell Seal-less Pumps and Hydra-Cell Metering Solutions pumps in many installations for a variety of applications.

## Versatile, Economical and Easy to Operate

- Manual-control SM models feature a simple hand-operated dial with stroke adjustment in 3% increments up to 300 strokes per minute.
- SP, ST & SA models have pulse-in (SP), pulse-in with timer (ST) or pulse-in/analog-in (SA) control and stroke adjustment in 1-stroke increments up to 300 strokes per minute.
- SP, ST & SA models also feature simple key operations and intuitive user interface - a bright, sharp LED display is clearly visible in lowlight as well as high-glare areas.
- “Eco-friendly” environmentally sound operation is standard with SP, ST & SA models - this feature can lower power consumption up to 55%.
- Innovative S Series design minimizes dead space and prevents air entry and build up inside the pump - for added safety, all models have an air release valve and can be equipped with an optional integral relief valve.
- Double-ball check valve ensures accurate metering and reduces the chance of water hammer.
- PVC, PVDF, 316SS, and Acrylic liquid end component choices to match specific applications.
- Model available with a pump head that can be moved in three directions to provide flexibility of installation.
- Waterproof (IP65), dust-resistant structure ideal for indoor or outdoor use.
- Pump housing is molded from high-impact PPO, an engineered thermoplastic that provides dimensional stability and excellent resistance to heat.
- Power supply range for operation between AC100 and 240V (±10%) with plugs available for North America, Europe, UK, and Asia.
- Fast, easy maintenance as liquid-end parts can be disassembled and replaced by simply detaching four bolts.



# Hydra-Cell S Series Electronic Solenoid Metering Pumps

## Typical Applications for S Series Chemical Injection Metering Pumps

- Chemical injection/metering
- Food and beverage processing
- Colorant addition for paints and dyes
- Pulp and paper mills
- Pharmaceutical processing
- Municipal and industrial water purification and wastewater treatment
- De-chlorination treatment for Reverse Osmosis (RO) film process
- Special models for high-pressure boiler feed
- Special models for high-viscosity fluids
- Special models for outgassing fluids (including injection of Sodium Hypochlorite)

S Series Solution Tanks combine the pump with a tank unit to offer large capacity in a compact, space-saving design. They are easy to install and optionally available in three sizes: 30L (7.9 gal), 50L (13.2 gal), 120L (31.7 gal).



## SM Models Flow Capacities and Pressure Ratings

Model Number	Maximum Discharge Volume			Maximum Discharge Pressure	
	ml/min	gph	lph	psi	bar
SM030 High Pressure	28	0.44	1.68	217	15
SM030	30	0.48	1.80	145	10
SM060	60	0.95	3.60	116	8
SM100	100	1.59	6.00	58	4
SM03R* High Pressure	28	0.44	1.68	217	15
SM03R*	30	0.48	1.80	102	7
SM06R*	60	0.95	3.60	102	7
SM10R*	100	1.59	6.00	58	4

\*Models equipped with internal relief valve.

### Stroke Speed:

15 to 300 strokes/minute (manual dial setting)

### Stroke Length:

Fixed at 1.0 mm

### Temperature Range:

32°F to 104°F (0°C to 40°C)

### Ambient Humidity:

35% to 85%

## SP/ST/SA Models Flow Capacities and Pressure Ratings

Model Number	Maximum Discharge Volume			Maximum Discharge Pressure	
	ml/min	gph	lph	psi	bar
SP, ST or SA030 High Pressure	25	0.40	1.50	290	20
SP, ST or SA030	30	0.48	1.80	145	10
SP, ST or SA060	60	0.95	3.60	145	10
SP, ST or SA100	100	1.59	6.00	58	4
SP, ST or SA200	220	3.49	13.20	29	2
SP, ST or SA03R* High Pressure	28	0.44	1.68	217	15
SP, ST or SA03R*	30	0.48	1.80	145	10
SP, ST or SA06R*	60	0.95	3.60	102	7
SP, ST or SA10R*	100	1.59	6.00	102	7

\*Models equipped with internal relief valve.

### Stroke Speed:

1 to 300 strokes/minute (enables setting in 1-stroke units)

### Stroke Length:

0.5 mm to 1.0 mm (enables adjustment using the dial)

### Temperature Range:

32°F to 104°F (0°C to 40°C)

### Ambient Humidity:

35% to 85%

For complete specifications and ordering information, consult the Hydra-Cell S Series metering pumps catalog.

# Hydra-Cell T and Q Series Pumps



## T and Q Series Design Features

- Seal-less design separates the power end from the process fluid end, eliminating leaks, hazards and the expense associated with seals and packing.
- Low NPSH requirements allow for operation with a vacuum condition on the suction - positive inlet pressure is not necessary.
- Can operate with a closed or blocked suction line and run dry indefinitely without damage, eliminating downtime and repair costs.
- Unique diaphragm design handles more abrasives with less wear than gear, screw or plunger pumps.
- Hydraulically balanced diaphragms handle high pressures with low stress.
- Provides low-pulse, linear flow due to its multiple-diaphragm design.
- Lower energy costs than centrifugal pumps and other pump technologies.
- Rugged construction for long life with minimal maintenance.
- Compact design and double-ended shaft provides a variety of installation options.



The low-pressure models of Q155 Series high-horsepower quintuplex pumps offer the highest flow rate capabilities in the entire Hydra-Cell Seal-less Pumps product line. Like the T100 Series, the Q155 Series is available to meet API 674 Performance Standards.



Depending on pump model, T100 Series high-horsepower triplex pumps are available with NPT or ANSI flange ports in Nickel Aluminum Bronze (NAB) or Stainless Steel pump heads.



Hydra-Cell model T100 was a finalist in the Pumps & Systems "Product Innovation" awards, and the T100 Series earned a "Spotlight on New Technology" award from the Offshore Technology Conference.

Model	Maximum Capacity			Maximum Discharge Pressure	Model	Maximum Capacity			Maximum Discharge Pressure
	gpm	l/min	BPD	psi (bar)		gpm	l/min	BPD	psi (bar)
<b>T100E</b>	96.0	366.1	3292	1500 (103)	<b>Q155E</b>	157	595	5383	1500 (103)
<b>T100F</b>	76.5	289.6	2623	1850 (128)	<b>Q155F</b>	127	490	4354	1850 (128)
<b>T100H</b>	68.0	257.8	2332	2100 (145)	<b>Q155H</b>	111	421	3806	2100 (145)
<b>T100K</b>	45.0	170.4	1543	3000 (207)	<b>Q155K</b>	78	295	2674	3000 (207)
<b>T100M</b>	38.0	143.8	1302	3500 (241)	<b>Q155M</b>	65	246	2228	3500 (241)
<b>T100S</b>	26.0	98.4	891	5000 (345)					

Maximum Inlet Pressure for all models: 500 psi (34 bar).

Maximum Operating Temperature for all models: 180°F (82°C). Consult factory for correct component specification for temperatures above 180°F (82°C) or below 40°F (4°C)

# Non-metallic ANSI Centrifugal Pumps

## STAN-COR

- Solid PVDF pump head for chemical compatibility and excellent abrasion resistance.
- Operate with a smooth, full-curve performance.
- Concentric casing design for better flow patterns than other centrifugal pumps - less turbulence, longer seal life, and reduced shaft deflection.
- Handles high operating temperatures.
- Compact design features including heavy-duty drive shaft, adjustable bearing supports, and large-capacity oil bath ensure low maintenance as well as durable performance for the toughest fluid applications.
- Back pull-out design for easy servicing.
- Handles solid sizes up to 9/16" maximum.

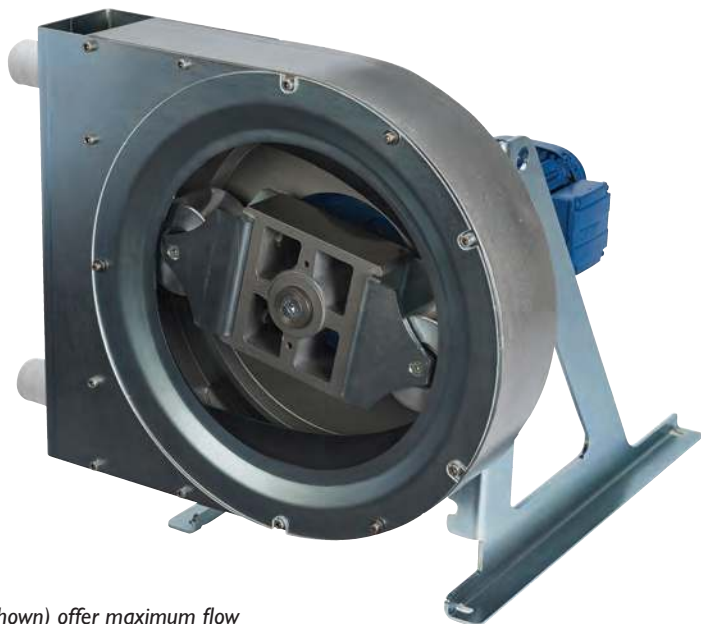


*Designed to handle difficult process fluids, Stan-Cor pumps offer total dynamic head to 350 feet and flow rate capacities to 700 gpm (2650 l/min).*

# Peristaltic Pumps that Isolate the Pumped Fluid

## VECTOR

- Dry pump cavity.
- Self-priming operation.
- Runs dry without damage to the pump.
- Complete isolation of the fluid being pumped from contact with mechanical parts for the fluid transport system.
- Heavy-duty roller bearings.
- Wide range of pump configurations and flow rates.
- No cups, packing, or dynamic seals to leak or replace or come in direct contact with the pumped fluid.
- Low maintenance.
- Reversible flow.



*Ten 2000 and 3000 Series Vector pump models (2006 shown) offer maximum flow rates from 0.3 gpm to 211 gpm and discharge pressures from 30 psig to 116 psig depending on pump model.*

*Seven 4000 Series Vector pump models offer maximum flow rates from 0.79 gpm to 154.1 gpm and discharge pressures of 110 psig or 218 psig depending on pump model.*

# Hydra-Cell®

## Seal-less Pumps

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